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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

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**MEMORANDUM**

**SUBJECT:** Initial Apricot Benefits Assessment for Phosmet

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**SUMMARY**

Phosmet is used to control two apricot pests – the peach twig borer and Oriental fruit moth. Only a few cultural activities would be impacted if the REIs for phosmet were extended. The greatest impact would be seen on IPM and mating disruption programs. Extension of REIs may cause growers to spray earlier and often times unnecessarily as a prophylactic in order to enter the harvest period without the worry of a damaging pest incursion.

**BACKGROUND**

The apricot, *Prunus armeniaca* L., is found in the *Rosaceae*, subfamily *Prunoideae*. It is in the same subgenus as plums (*Prunophora*), and crosses between apricot and plums have yielded "plumcots" and other hybrids. There are 3-10 species in the *Armeniaca* section of the subgenus *Prunophora*. Other well-known species very similar to *P. armeniaca* are *P. sibirica*, *P. mandshurica*, *P. mume*, and *P. dasycarpa* (a natural hybrid between *P. cerasifera* and *P. armeniaca*). While this group presents great genetic diversity in tree size, stress tolerance, bloom date, and fruit quality, there are very few apricot cultivars grown commercially throughout the world, almost all of which derive

straight from *P. armeniaca*. Cultivars also tend to be grown in only one region of a given country, and most would be virtually unknown outside of that region. In California, 'Blenheim' (syn. 'Royal') and 'Tilton' are the major mid-season cultivars. In Washington, 'Wenatchee Moorpark' is the main cultivar, followed by 'Tilton', 'Royal', and 'Perfection.'

The apricot is a small to medium sized tree with a spreading, dense canopy; generally kept <3.5 m in cultivation. Leaves are cordate with acute to acuminate tips about 8 cm wide. One year wood and spurs are thin and twiggy. Flowers are about 1 inch in diameter and white to pinkish in color. Solitary flowers are borne in leaf axils of one year wood or on short spurs which are short lived (2-3 yr). Most US cultivars are self-fruitful and do not require a pollinizer. Fruit require thinning for optimal size and to prevent biennial bearing. Fruit are spaced 1.5 to 3 inches apart on stems.

Apricots grow best on deep, fertile, well-drained soils. However, apricots are moderately tolerant of high soil pH and salinity. Apricot culture is most successful in mild, Mediterranean climates where the danger of spring frost is limited and disease pressure is low. Chilling requirement for fruit production ranges from 400-1000 hours. Post-rest heat requirement is very short causing apricots to bloom early. Most apricots ripen in early to mid-summer, between June and August.

Apricot cultivation is very similar to peaches since they require good light exposure for fruit color development. Common spacing for trees is 20-24 feet. In California, apricots are trained to for a modified open center (Winters system). This training produces a tall, shallow-mantled open center tree. Apricots are pruned (dormant) heavily in as they bear too many fruit and are vigorous. Most new growth and interfering wood is removed each year, exposing the spurs to maximal sunlight. Furrow irrigation is most common.

Apricots for fresh consumption are picked firm-mature, since they are far too soft for shipping if allowed to approach ripening on the tree. Fruit is hand picked and carefully handled. Firmness is a reliable indicator for ripeness, as for plums. Days from full bloom is a fairly reliable index given the relatively invariable growing conditions. However, proper flavor never develops in fruit picked prior to physiological maturity. Trees are usually picked over 2-3 times each, when fruit are firm. Apricots for drying are harvested when they are fully ripe.

Fresh apricots are shipped in shallow containers to prevent crushing/bruising. Apricots have an extremely short shelf-life (1-2 weeks at 0° C and 90% relative humidity).

Apricots are grown commercially in the Western US (CA, UT, and WA). The largest production area for apricots is California. Approximately 93% of US apricot acreage is in CA with bearing acreage in 2000 of 19,000 acres.

Total apricot production for the US in 2000 was 99,900 tons of which 88,760 tons were utilized. National price for apricots in 2000 was \$356.00/ton. Of the utilized tonnage in CA, 34.3% were for fresh market and 65.7% was processed (canned, dried, or frozen).

## USE OF PHOSMET ON APRICOTS

**Target Pests for Phosmet:** Pests of apricot which are controlled using phosmet include Peach twig borer and Oriental fruit moth.

**Peach twig borer** - Peach twig borer can damage stone fruits by feeding in shoots and causing shoot strikes, or by feeding directly on the fruit. Shoot damage is most severe on the vigorous growth of young, developing trees (first to third leaf) because feeding kills the terminal growth and can result in undesirable lateral branching.

As fruit matures, it becomes highly susceptible to attack; damage is most likely to occur from color break to harvest. Twig borer larvae generally enter fruit at the stem end or along the suture and feed just under the

skin. Feeding damage or the presence of larvae will cause fruit to be offgrade. There may be three to four generations of peach twig borer each year but the later generations occur after apricot harvest.

**Oriental fruit moth** - Oriental fruit moth causes damage by feeding on developing shoots and fruit. They overwinter as mature, diapausing larvae inside tightly woven cocoons in protected places on the tree or in the slash and debris near the base of the tree. Pupation takes place inside the cocoon and adults begin emerging in February or early March in California. Eggs are deposited on newly emerged shoots and the larvae feed in terminals where they complete their development. Feeding on the shoots causes the tip of the shoot to die, causing shoot strikes or flagging. The most severe damage occurs where larvae feed on fruit causing it to be rated offgrade. Larvae bore to the center of the fruit and feed around the pit. Feeding damage may also increase the incidence of fruit decay. After reaching maturity, the larvae exit from the fruit and pupate. There are generally five generations per year in California, though a sixth generation has been observed in years with warm weather in early spring.

In orchards treated with insecticides, shoot strike is monitored early in the season, especially in April and early May, to assess the development of a potentially damaging population. If the number of shoot strikes is excessive, insecticides are applied to the second flight to reduce oriental fruit moth population levels. In orchards with heavy infestations, additional sprays are needed to prevent fruit damage at harvest.

Fruit is also monitored for the presence of worms. Generally fruit is most heavily attacked in the tops of the trees, so fruit samples should be picked and examined from that area. Although green fruit can be attacked, fruit is most susceptible to attack by oriental fruit moth after color break.

Either bait pans or pheromone traps are used to monitor adult flights. Once the first moth is trapped, degree-days (DD) are accumulated to estimate when the onset of the second flight will occur, usually in May. Once the second flight has started, treatments are applied at 500 to 600 DD to achieve optimum control. Moths are continuously monitored until the crop is harvested in order to detect late-season peaks or migrations of moths from adjacent orchards. If treatments are needed for the third and fourth flights, sprays are made at 400 DD after the start of the flight if the fruit is coloring; or 500 DD if it is not coloring.

#### **Alternative Pest Control Methods:**

**Peach twig borer** - Alternative insecticides are available to control peach twig borer. During the dormant and delayed dormant period these insecticides include narrow range oil plus esfenvalerate, diazinon, spinosad, and methidathion. Control can be achieved during the bloom period using 2 applications of *Bacillus thuringiensis* (beginning between popcorn stage and bloom and the second 7-10 days later, but not past petal fall). Mating disruption is also an alternative control method during the bloom stage. Insecticides which can be used against peach twig borer during the postbloom stage are spinosad, endosulfan, diazinon, carbaryl, and esfenvalerate. Carbaryl and diazinon applications require a permit from a county agricultural commissioner for purchase or use.

**Oriental fruit moth** - Oriental fruit moth control can be achieved with pheromone mating disruptants or insecticides. Alternative insecticides to azinphos-methyl and phosmet to control this pest include methomyl, esfenvalerate, diazinon, and carbaryl. However, each of the alternatives has resistance problems or can be disruptive of established IPM programs.

Oriental fruit moth control can be achieved with pheromone dispensers. However, this is the least popular control method mainly due to costs. Mating disruptants are applied just before or at first moth emergence in spring (roughly around March 1). Baits are replaced about every 3 months at a rate of 150 baits per acre. The baits are set up by hand labor. Growers and PCAs are reluctant to use pheromone mating disruption due to the potential for secondary pest outbreaks of oblique banded leafroller (OBLR) and katydids in the absence of broad spectrum insecticides, the increased cost of pheromone application, and the difficulties some growers have experienced with mating disruption failure to suppress reproduction of the target pest.

Azinphos-methyl and phosmet are still essential when recovery applications are necessary due to failure of mating disruption programs.

#### **IMPACTS ON CROP PRODUCTION:**

**Fruit Thinning** – Apricot trees produce more fruit than can mature to a commercially competitive size for the fresh market. Consequently, fruit must be thinned, whereby excess apricots are selectively removed, primarily by hand with rubber hoses (i.e. by tapping the fruit to dislodge them). Occasionally orchards may have to be re-thinned when too much fruit was mistakenly left the first time, or when hail damage occurs. Fruit thinning also reduces the likelihood that limbs will break by reducing the fruit load. Timely thinning is crucial to the production of fresh market fruit with acceptable fruit size.

Phosmet spraying occurs after fruit thinning. Fruit thinning activity would not be impacted by extension of the phosmet REI.

**Irrigation** - Apricots are irrigated by furrow. Furrows are established at planting and allow minimal maintenance during the production season. Irrigation should not be impacted by extension of phosmet REI.

**Pruning** - Apricots are pruned early in the season. This activity would not be impacted by extension of the phosmet REI.

**Propping** - About 33 percent of the late varieties of apricots are propped to prevent limb breakage as fruit size increases. Usually the trees are propped prior to spraying. If the phosmet REI was extended to a point that propping is prohibited, economic losses could result.

**Harvesting** - Apricots are harvested by hand. Extending the phosmet REI for hand harvesting to that equal to the PHI (14 days for phosmet) should not result in a grower impact.

**IPM Disruption** - It is also projected that an REI of 7 days or greater would result in the use of less desirable replacement insecticides, i.e., synthetic pyrethroids that are less compatible with integrated pest management (IPM). These can precipitate secondary pest outbreaks such as San Jose scale and spider mites, and cause growers to resort to the use of expensive miticides. Use of the non-OP alternative insecticides would solve the pest problem but would predictably cause a flare in spider mites within 30-45 days. To avoid catastrophic damage to the orchard resulting from defoliation caused by spider mites, miticide applications would be necessary to control this pest at a cost of \$35-80 per acre. In addition, extension of REIs would likely mandate prophylactic insecticide application to ensure crop protection prior to harvest.

**Mating Disruption Program** - As some stone fruit producers have moved away from OPs to softer insecticides, new primary pests have emerged. Katydids, lygus bug, stink bug, and chinch bugs have regained primary pest status in orchards which have moved to softer insecticide programs based on *Bts* and mating disruption. It generally takes two years after a grower ceases using OP materials for the population of these pests to build to dangerous levels.

Many of the new materials are surgical in nature and tend to address only one pest. A mating disruption program in situations where producers have problems with peach twig borer, oriental fruit moth, scale, and obliquebanded leafroller would require the use of four materials and sufficient time to monitor four life cycles. In this situation the farming operation would likely not see a profit. Conversely, if pest pressures are low and only one or two pests are a threat, mating disruption and application of *Bt* can make good economic sense. For late season varieties which have a history of problems with Oriental fruit moth and Peach twig borer, phosmet is usually used only to knock down the population in the second flight. However, it is important to have phosmet available in the event of a late season incursion where

populations surpass maximum threshold. Extension of the REI would likely cause growers to spray earlier and often times unnecessarily as a prophylactic in order to safely enter the harvest season without the worry of a damaging pest incursion.

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